# FIRST TWO CASES OF MELANISM IN CORY'S SHEARWATER *CALONECTRIS DIOMEDEA*

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**SUMMARY**

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Although aberrant colourations occur in a great variety of animal species, their frequency of occurrence is low. Here, we report the first two observations of melanistic Cory's Shearwaters *Calonectris diomedea,* in the Azores archipelago and on the Canary Islands. Because dark plumages may be associated with subordinate status within petrel flocks and with increased conspicuousness, melanistic individuals would have increased difficulties in obtaining food compared with their normally coloured conspecifics. This phenomenon might explain why melanism seems to occur less frequently than other aberrant colour patterns in this group.

Key words: Melanism, Cory's Shearwater, *Calonectris diomedea,* Procellariiformes

## INTRODUCTION

Aberrant colourations have a low frequency of occurrence in vertebrates; however, they are observed in a great number of species (Sage 1962, Pigg 1998, Bried & Haubreux 2000, Watkins-Colwell 2002), including seabirds (e.g. Guerra & Fitzpatrick 1987, Bried & Mougeot 1994, Voisin *et al.* 2002, J. Bried unpubl. data). In this paper, we report the first observations of melanistic Cory's Shearwaters *Calonectris diomedea.*

## METHODS

Our observations took place at San Andrés, Arucas, Gran Canaria (28°N, 15°45′W), Canary Islands, and at Horta (38°36′N, 28°47′W), Faial Island, Azores (both archipelagos are situated in the subtropical northern Atlantic), during rescue campaigns that have been conducted annually since 1997 to save Cory's Shearwater fledglings that land on roads or near human settlements after being attracted by streetlights upon their departure to sea between late October and late November.

During these campaigns, birds brought to the nature wardens, to rehabilitation centers or to the lab are examined for eventual injuries, and biometrics are taken (wing length using a stopped ruler correct to 1 mm; tarsus length, culmen length and bill depth at gonys using a Vernier caliper correct to 0.1 mm; body mass using a 1 kg or 1.5 kg Pesola spring balance). A few feathers are plucked from the Azorean fledgling for molecular sexing, which was conducted following Griffiths *et al.* (1998).

## RESULTS

Between 1997 and 2004, 5990 and 335 Cory's Shearwater fledglings were found, dead or alive, on Gran Canaria and Faial Islands respectively. Amongst the fledglings, two dark-plumaged individuals were found in 2003. The first individual was found near a pier at San Andrés on 30 October. The second observation occurred in a street of Horta on 21 November.

The general appearance of each individual was that of a large, entirely dusky shearwater with a pale bill and dark legs (Figs. 1, 2 and 3). The plumage characteristics shared by the two birds are described as follows: head and hindneck sooty brown. Mantle, back and rump very dark brown (much darker than in normally coloured Cory's Shearwaters), with slightly paler fringes at the tip of the feathers (which is typical of juveniles in this species). Uppertail coverts uniformly blackish brown, missing the pale band present in normal individuals; rectrices black. Body underparts, from the chin to the cloaca, uniform medium grey, but base of feathers paler. Undertail coverts, grey with darker barrings. Wings still darker than body, with blackish-brown upperwing coverts and black remiges.

**Fig. 1.** Upperparts of the melanistic Cory's Shearwater *Calonectris diomedea* from the Azores (middle), a normally coloured Cory's Shearwater (bottom), and a Sooty Shearwater *Puffinus griseus* (top). Photo by Bob McGowan.

The Canary individual still had down on the belly, the breast, the neck and the extremity of the rectrices; however, the down was not darker than in normally coloured juveniles (Fig. 3). It also had pale grey greater underwing coverts, and medium- to dark-grey median, lesser and marginal underwing coverts. In the Azorean bird, the underwing pattern recalled that of a Sooty Shearwater *Puffinus griseus,* although the contrast between the dark and the silvery parts was less obvious. The colour of the eyes and the yellowish horn colour of the bill were normal in both individuals. However, the greenish sides of both maxillary and mandibular unguis were darker than in normally coloured individuals. In the Canary individual, the dark markings also extended along the cutting edge of the distal two thirds of the mandible (Fig. 3). The legs of the individual from Gran Canaria were uniformly grey (Fig. 3); those of the Azorean bird were of a darker pink than in normal individuals, with a diffuse blackish wash on the tarsi and the toes (Fig. 2).

The individual found in the Azores proved to be a female. Its measurements and its weight are given in Table 1. Because it seemed weakened when found, it was held for rehabilitation, but it died during the night of 25–26 November 2003. The specimen was donated to the Natural History collection of the Royal Scottish Museum of Edinburgh (accession number NMSZ 2004.221).

The individual found on Gran Canaria, which seemed robust and healthy, was ringed and released.

**Fig. 2.** Underparts of the melanistic Cory's Shearwater *Calonectris diomedea* from the Azores (middle), the same normally coloured conspecific (bottom), and the same Sooty Shearwater (top) as in Fig. 1. Photo by Bob McGowan.

## DISCUSSION

To date, melanism has never been reported in Cory's Shearwater, but several records of albino individuals exist (Appendices 1 and 2), including one in the Azores and another on the Salvages Islands (M. Laranjo, L.R. Monteiro, Z. Moniz & J. Serra unpubl. data), and one record of a leucistic juvenile in the Mediterranean (see Leopold & Keijl 2004). To the best of our knowledge, our observations represent the fourth and fifth reported cases of melanism within the order Procellariiformes (i.e. albatrosses and petrels). The three other cases included a Manx Shearwater *Puffinus puffinus* fledgling (Davis & Packer 1972), an all dark adult or subadult (given the date of observation) Wilson's Storm Petrel *Oceanites oceanicus* (Curtis 1988), and a recently fledged Grey-backed Storm Petrel *Garrodia nereis* (Bried & Mougeot 1994). However, the Wilson's Storm Petrel was not captured, so that the hypothesis of an oiled individual cannot be dismissed.

The very low incidence of melanism in Procellariiformes, as compared with other aberrant colours (see Appendices 1 and 2), seems *a priori* surprising, given that several species have dark colour morphs (reviews in Warham 1990, Brooke 2004). However, melanism appears to occur less frequently in birds than does albinism (Sage 1962), partly because some abnormally dark colourations may result from dietary deficiencies (Voisin *et al.* 2002), which may

**Fig. 3.** Melanistic Cory's Shearwater *Calonectris diomedea* from Gran Canaria. Photo by PCM.

**TABLE 1**
**Measurements (mm) and body mass (g) [a] of fledgling Cory's Shearwaters found in the streets of Faial Island during the autumn of 2003**

| | Wing [b] | Tarsus | Culmen | Gonys | Mass |
|---|---|---|---|---|---|
| Melanistic female | 350 | 57.0 | 49.5 | 12.5 | 580 |
| Females sexed from calls [c] | 353.6±6.8 | 56.2±1.1 | 51.9±1.7 | 13.8±0.4 | 658.3±59.8 |
| | (348–362) | (54.7–57.3) | (49.7–52.5) | (13.4–14.4) | (550–720) |
| | n=5 | n=5 | n=5 | n=5 | n=6 |
| All fledglings | 358.6±7.0 | 57.5±2.2 | 52.8±2.1 | 13.8±0.8 | 705.9±92.9 |
| | (344–371) | (53.2–61.8) | (49.3–57.7) | (11.0–15.2) | (430–940) |
| | n=32 | n=27 | n=25 | n=25 | n=120 |

[a] Mean ± standard deviation (range).
[b] Flattened wing chord.
[c] Vocalizations are sexually dimorphic in this species (Bretagnolle & Lequette 1990, Thibault & Bretagnolle 1995); however the melanistic individual from the Azores never called.

**APPENDIX 1**
**Aberrant colours observed in procellariiforms**

| Species | Colour | Source |
|---|---|---|
| *Diomedea exulans* | Leucism | Bried & Mougeot 1994 |
| *Phoebastria immutabilis* | Total and partial albinism, wing speckling | Fisher 1972 |
| *Phoebastria nigripes* | White plumage, partial albinism | Tickell 2000 |
| *Phoebetria palpebrata* | Partial albinism | Bried & Mougeot 1994 |
| *Pelecanoides georgicus* | Partial albinism | Bried & Mougeot 1994 |
| *Pterodroma macroptera* | Partial albinism | Bried & Mougeot 1994 |
| *Pterodroma solandri* | Partial albinism | Bried & Mougeot 1994 |
| *Pterodroma arminjoniana* | Partial albinism | Bried & Mougeot 1994 |
| *Pterodroma leucoptera* | Partial albinism | Bried & Mougeot 1994 |
| *Pterodroma neglecta* | Total albinism, asymmetric pattern | Bried & Mougeot 1994 |
| *Pterodroma baraui* | Leucism (3 cases) | Société d'Etudes Ornithologiques de La Réunion pers. comm. |
| *Pterodroma nigripennis* | Black base of axillaries | Bried & Mougeot 1994 |
| *Fulmarus glacialis* | Total albinism | B. Zonfrillo pers. comm. (specimen kept at the Royal Scottish Museum of Edinburgh) |
| *Thalassoica antarctica* | Isabellinism | Bried & Mougeot 1994 |
| *Puffinus lherminieri bailloni* | Isabellinism | Société d'Etudes Ornithologiques de La Réunion pers. comm. |
| *Puffinus bulleri* | Partial albinism | Shearwater Journeys (http://www.shearwaterjourneys.com) |
| *Puffinus puffinus* | Partial albinism, melanism | Bried & Mougeot 1994; Davis & Packer 1972 |
| *Puffinus mauretanicus* | Partial albinism | Bried & Mougeot 1994 |
| *Puffinus gravis* | Total and partial albinism | Bried & Mougeot 1994 |
| *Puffinus tenuirostris* | Total and partial albinism | Bried & Mougeot 1994 |
| *Puffinus griseus* | Partial albinism | Bried & Mougeot 1994 |
| *Puffinus carneipes* | Partial albinism | Bried & Mougeot 1994 |
| *Puffinus huttoni* | Partial albinism | Bried & Mougeot 1994 |
| *Procellaria aequinoctialis* | Total and partial albinism | Bried & Mougeot 1994 |
| *Calonectris diomedea* | Total albinism (several cases), partial albinism, leucism, melanism | M. Laranjo, L.R. Monteiro, Z. Moniz & J. Serra unpubl. data; P. Calabuig Miranda unpubl. data; Ristow & Witte 2004; review in Leopold & Keijl 2004; this study |
| *Calonectris leucomelas* | Total albinism | Bried & Mougeot 1994 |
| *Pachyptila belcheri* | Total albinism | Bried & Mougeot 1994 |
| *Oceanites oceanicus* | *Pealea*[a] pattern, partial and maybe total melanism | Bried & Mougeot 1994; Bourne 1987; Curtis 1988 |
| *Fregetta grallaria* | *Pealea* pattern | Bried & Mougeot 1994 |
| *Fregetta tropica* | *Pealea* pattern | Bried & Mougeot 1994 |
| *Garrodia nereis* | Melanism | Bried & Mougeot 1994 |
| *Oceanodroma leucorhoa* | Total albinism | Oxley 1999 |
| *Oceanodroma castro* | Partial albinism (2 cases) | J. Bried unpubl. data |
| *Hydrobates pelagicus* | Partial albinism (several cases) | Bried & Mougeot 1994; Sultana & Borg 2002 |

[a] The *Pealea* pattern is characterized by dark streakings on white underparts (see Warham 1990, p. 176), somewhat recalling the New Zealand Storm-Petrel *Oceanites maorianus.*

**APPENDIX 2**
**Incidence of aberrant colouration in various populations of Cory's Shearwaters**

| Locality | Total | Adults | Fledglings and chicks | Aberrant individuals[a] | Source |
|---|---|---|---|---|---|
| Spanish Mediterranean | 283 | 283 | 0 | 0 | J. González-Solís (pers. comm.) |
| Porquerolles (France) | 39 | 33 | 6 | 0 | J. Legrand, E. Vidal & K. Bourgeois (pers. comm.) |
| Lavezzi islands (Corsica) | *ca.* 3500 | *ca.* 1500 | *ca.* 2000 | 0 | J.C. Thibault (pers. comm.) |
| Malta | 3200 | — | — | 112 (0)[b] | J.J. Borg (pers. comm.) |
| Crete | >5300 | >2400 | >2900 | 2 (0) | Ristow & Witte (2004) |
| Cape Verde[c] | 30 | 30 | 0 | 0 | J. González-Solís (pers. comm.) |
| Canary Islands, 1997–2004 | *ca.* 13000 | *ca.* 120 | 12 878 | 3 (1) | This study |
| Canary Islands | 224 | 224 | 0 | 0 | J. González-Solís (pers. comm.) |
| Azores, 2000–2004[d] | 2067 | 1367 | 700 | 1 (1) | M. Bolton & J. González-Solís (pers. comm.), this study |

[a] First number corresponds to the total number of cases; number of melanistic individuals is given in parentheses.
[b] Birds with only one white feather on the head (maybe due to aging or a wound, see Sage 1962) were included.
[c] *Calonectris diomedea edwardsii.*
[d] In the Azores, many birds were captured several times. We excluded recaptures in our counts.

adversely affect survival and hence the probability of observation. The fledgling from the Canary islands was healthy and in good condition, but that from the Azores was lighter than average (Table 1). However, the latter bird's measurements (Table 1) and the absence of deformities suggest that it grew normally. Therefore, the existence of poor feeding conditions during chick-rearing can be ruled out here. Rather, the variations in underwing, leg and bill colour between these two individuals are compatible with a genetic origin of their melanism.

Genetic melanism is generally controlled by dominant alleles (Sage 1962, Eizirik *et al.* 2003), and it can become more widespread in a population if there is an advantage to the darker colour (reviews in Sage 1962, Grant & Wiseman 2002). However, dark plumages seem to be associated with subordinate status within some multi-species flocks of petrels at sea (Bretagnolle 1993). Additionally, as compared with white underparts, dark underparts may increase the conspicuousness of a bird sitting at or flying close to the sea (Simmons 1972), so that potential prey can detect its presence earlier. Therefore, melanistic petrels might experience greater difficulties in obtaining food than do their normally coloured conspecifics. The paucity of records despite a high capture effort (Appendix 2; JB, HF, PCM & VCN unpubl. data for other procellariiform species) and the high proportion of juveniles in the cases reported are in accordance with this hypothesis and with previous findings showing that aberrantly coloured individuals often survive and reproduce less well than their normal conspecifics (Hain & Leatherwood 1982, Ellegren *et al.* 1997).

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